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ABSTRACT

An appraisal of medical education and college preparation for medicine was undertaken through public hearings and written submissions from 82 medical schools, 24 colleges, and 21 professional societies. Views and suggestions were provided on learning, clinical education, college preparation and admission to medical school, and faculty. It was suggested that despite the enormous amount of time devoted to instruction, medical school students are not necessarily prepared to be independent learners who can apply critical, analytic abilities to problem-solving. Concern was expressed regarding the emphasis on memorization of factual details and the need for faculty to identify essential concepts and principles. More small group instruction and more time for independent learning were also recommended. The contribution of computer technology and overall impediments to change in medical education were also identified. The clinical component was characterized as permissive, often poorly-integrated, and frequently undersupervised. Another concern was the debate regarding a balanced preparation for medical school (i.e., sciences versus humanities). Greater recognition for the educational efforts of medical school faculty members was suggested in order to accomplish changes needed in the general professional education of the physician. (SW)

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EMERGING PERSPECTIVES ON THE GENERAL PROFESSIONAL EDUCATION OF THE PHYSICIAN: PROBLEMS, PRIORITIES, AND PROSPECTS. REPORTED TO THE PANEL BY THE MEDICAL SCHOOLS, COLLEGES, AND ACADEMIC SOCIETIES.

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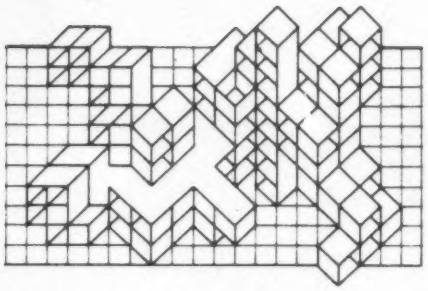

EMERGING PERSPECTIVES ON THE GENERAL PROFESSIONAL EDUCATION OF THE PHYSICIAN

Problems, Priorities, and Prospects / Reported to the Panel by the Medical Schools, Colleges, and Academic Societies

During the past two years the Association of American Medical Colleges has engaged medical schools, colleges, and professorial societies in an appraisal of medical education and college preparation for medicine. Through public hearings and written submissions, 82 medical schools, 24 colleges, and 21 societies have offered their observations, expressed their concerns, and suggested ways of improving the general professional education of medical students. This report is a compilation of what has been reported about students' general professional education by those most intimately involved—the students and the faculty. Under each topic, briefly stated observations have been framed to reflect views delineated in the institutional reports of medical schools, colleges, and societies. Verbatim quotations have been selected from the reports. These quotations, in the aggregate, define the problems as perceived by those who have participated in the project. While these quotations are selective, they encompass the range of concerns that have been expressed about the general professional education of the physician.

"The most compelling consequence of these deliberations will be restoration of a sense of joy and enthusiasm of our medical students for the excitement, wonder, and future of the biomedical sciences and human medicine . . . "

During the next year, the project panel will study the scope of these and subsidiary problems and the range of options that might be applied in their solution. The quality of the general professional education of the physician and college preparation for medicine is the responsibility of each institution's faculty; these emerging perspectives are presented to stimulate further exploration.

PERSPECTIVES ON LEARNING

Collectively, medical school faculties devote an enormous amount of time to teaching medical students. Yet, they are concerned that how and what students learn do not necessarily prepare them to be independent learners who can apply critical, analytic abilities to problem-solving.

Memorization of Facts

■ That students are required to memorize a vast amount of factual detail is widely acknowledged to be a problem.

"There is unanimity in deploring that students are submerged by details and memorization of facts, that the amount of information taught during the preclinical phase is excessive, and that rotation through separate clerkships is inadequate to prepare students for their future profession. Paradoxically, faculty would like to see new subjects introduced into the undergraduate curriculum, thereby increasing the information overload unless a better selection is made of the subject matter in the traditional as well as the new disciplines."*

"It is imperative that course content be reexamined with positive consideration of increased emphasis on concepts, problem-solving, and synthesis."

"The basic sciences, taught primarily in lecture format, foster passive learning of fragmented facts and provide little room for knowledge attained by self-discovery and reasoning."

"A concern is that there is too much emphasis upon facts without learning

**Verbatim quotations have been selected from reports submitted to AAMC.*

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the concepts necessary to organize them."

"The focus on details is evident in the nature of instruction, which emphasizes the transmission of detailed facts, and in evaluation which is heavily weighted to the 'multiple choice mentality' as epitomized in National Boards."

"Both basic scientists and clinicians agree that currently there is emphasis on memorization of facts rather than conceptualization and application, and that this state of affairs is both maintained and reflected by the methods used to evaluate students. Another factor which emerged was the educational schedule allows neither faculty nor students enough time to focus on concepts."

Identification of Concepts

■ The concern about emphasis on rote memorization of detailed facts is paralleled by a recognition of the need for the faculty to identify essential concepts and principles. Departmental competition for curriculum time and lack of interdisciplinary communication are seen as obstacles.

"The emphasis in medical school should be on mastering concepts of biology and disease rather than the memorization of facts without an understanding of how they relate to the care of patients."

"It is the general view of the College of Medicine that because of the tremendous knowledge explosion in the basic sciences and the resultant exponential expansion of clinical application information, faculty must work together in interdisciplinary groups to identify a manageable core of essential knowledge. . . . This problem is far from being solved however, largely because of faculty attitudes that link departmental esteem to identifiable hours in the curriculum. Until these attitudes are modified and faculty genuinely recognize the continuum nature of medical education, identification of a ***manageable*** essential curriculum will be difficult."

"A thorough examination of the first year of medical education at this institution—course content, contact time and teaching methodologies—confirmed that there was an enormous amount of material that medical students were expected to absorb in a 34 week period. It was agreed that the material presented was excessive for the time available. Student and faculty comments have documented the difficulty of achieving an appropriate atmosphere for learning when students must cope with high density courses totaling 41 credit hours in 34 weeks. Consequently, to provide additional time to facilitate comprehension and understanding rather than rote memorization of facts, the college has lengthened its first year by four weeks."

"A major impediment to curricular change may well be in the inability of the biological science and clinical science faculty to find a mechanism for effective interaction and change. A significant issue continues to be manifest in the fact that M.D. faculty do not see years one and two as part of their domain nor their area of purview and biological science faculty often do not have an appropriate perspective to make important decisions about what should be included in the first two years as opposed to what should not be."

"Teaching time is too compartmentalized with integration of knowledge and behaviors expected to occur automatically."

"A massive effort to deduce a more precise number of essential concepts and attendant facts was questioned, as well as the implication that this perforce translates into clinical wisdom in decision-making. A given fact at a fixed point in time can be useful to one physician with a patient. A second physician might well use another fact or concept to help the patient in question. The entire set of facts might not prove useful to current students by the time they begin practice."

"This use of clinical correlations in preclinical courses and preclinical correlations in clinical courses would: 1) improve the perception of relevance for the students; 2) improve faculty interaction; and 3) provide greater continuity in training for the student. Although this latter idea is not new, implementation of this idea is difficult for schools where curricula are established and not easily subjected to major disruptions."

". . . attempts to accommodate multiple views and interests should not be allowed to detract from an important objective of the educational process: namely, to identify, with clear limits and as concretely as possible, required knowledge and skills around which effective teaching programs can then be developed."

"Content is decided at the course level; external guidance comes from Part I of the National Boards, and individuals contribute specifics with informal departmental consensus. . . . Basic science faculty and chairmen are comfortable with this arrangement by and large, while clinical chairmen and faculty are generally not satisfied. Both clinicians and basic scientists agree that two-way interaction between their groups is appropriate and should be fostered, but clinicians would like to have more formal input at the conceptual level."

"Teaching time is too compartmentalized with integration of knowledge and behaviors expected to occur automatically. This problem is exaggerated by the functional separation of the basic and clinical science faculty."

"Although these are basic educational principles, it is no small task to orient faculty to these concepts and obtain agreement on core content. Indeed, the probability for agreement is not high. Faculty need to support the importance of their life's work."

Independent Learning

■ Added to faculties' recognition that rote memorization is excessive and undesirable are their statements that students must become independent learners and problem-solvers.

"Helping students to develop independent learning skills and making them 'open' to new ideas and inquiry were almost universally accepted as goals for medical educators; likewise, there was almost universal agreement that the present curriculum does not facilitate their accomplishment."

"Exercises in which students participate actively and are challenged by faculty, greater opportunity to write, and critical, careful appraisal of students' work all need to be encouraged—both in the undergraduate college years and once students come to

medical school, especially in the basic science years."

"There should be increased emphasis on critical evaluation of medical literature in order to develop skills in analysis and criticism."

"Independent learning skills are not fostered by heavy reliance on modalities which keep students away from books and journals. Faculty attitudes which do not foster a questioning attitude hinder intelligent self-study, i.e., clinical empiricism and uncritical presentation of data. To foster these skills we must 1) leave certain required material identified but not taught, 2) require critical evaluation of the literature by students, and 3) challenge the students in small group sessions on basic and clinical material."

"There is too much emphasis on knowledge transfer and insufficient opportunity for active learning and the development of problem-solving skills."

"Since physicians are primarily problem-solvers, it seems reasonable to suggest that independent learning and problem-solving skills are inseparable in medical education and that the development of such skills and attitudes should begin early in medical education."

"Medicine is an applied science centered on an active, problem-solving interpretation of information and observations. The basic sciences, taught primarily in lecture format, foster passive learning of fragmented facts and provide little room for knowledge attained by self-discovery and reasoning."

"We are embarking upon a new elective colloquium program for third and fourth year students intended to enrich and deepen their knowledge of student selected topics, especially in psychosocial and basic science areas relevant to clinical medicine; to provide experience in writing and presenting material orally; and stimulate self-directed learning habits conducive to later continuing medical education."

"As a means of increasing problem-solving experience, we are offering a one month elective, on an experimental basis, this fall, that will utilize the case-study approach as a mechanism for strengthening clinical reasoning skills. There will be particular emphasis in this course on the synthesis of multi-disciplinary basic and clinical science knowledge."

Reduction of Lectures

The lack of time for independent learning is evident in analyzing the preclinical curricula of 107 U.S. and Canadian medical schools. Some schools are attempting to reduce the number of lectures.

"Included is a reduction in class lecture contact time of approximately 10 to 15% in the first year and 10% in the second year with the use of available time as a longitudinal independent study morning/afternoon currently being planned as a mandatory experience for freshmen within subjects taught in the first year and an elective opportunity for students in the sophomore year aimed at research, clinical, or remediation experiences."

". . . the volume of didactic lectures needs to be reviewed so that time might be available for independent study . . . "

"As a first step in promoting increased independent study and self-motivated learning for students, the number of lecture hours in the basic curriculum of the first two years was reduced by an average of 10% in each quarter."

"Currently the faculty is working with the issue of limited attendance at lectures. This inquiry might develop into new, more efficient, independent learning."

"The dean of the college has encouraged faculty to reduce the number of lecture hours; a goal of 10% per year in each of the next five years has been recommended with a corresponding increase in innovative teaching activities."

"The consensus of the group appeared to be that the volume of didactic lectures needs to be reviewed so that time might be available for independent study and/or new and necessary courses."

"The students should have more unstructured learning periods and interactive class time to enhance these skills in the first two years of medical school—recommended solution—replace 30 to 50% of lecture time with active learning formats."

Small Group Instruction

■ A need to increase small group instruction where faculty can assist and guide students in learning is reported by most schools. Several appear to be planning to reduce lectures and use the freed time for seminars.

"To stress the importance of problem-solving, decision-making, the use of basic science knowledge and skills, and the skills of self-directed learning, the school has incorporated problem-based, self-directed learning in small groups into many segments of the curriculum."

"The use of small group tutorials and individualized learning should be increased with emphasis on exposure of students to faculty who are particularly capable of effective teaching in these settings."

"It is proposed that 50% of the material presented be done in small group discussion, laboratories or self-study units."

"All medical students are divided into small groups (10-12 in number) and are under the personal tutelage of a full-time faculty member supported by additional members of a health care team during the course of their studies.

"For example, following selected lectures, small groups of students might meet with a faculty member who would encourage them to challenge the concepts presented, place the concepts in historical perspective, and assign to each student one or more relevant papers in the literature to be discussed at a subsequent meeting."

"Independent learning, an essential goal, will be facilitated by decreasing length and number of lectures; giving increased emphasis to conference teaching; encouraging student teaching; offering summer fellowship programs for independent study and research; and improved student access to faculty."

"The course is a modified problem-based learning experience conducted in a small group format facilitated by a clinician and a basic scientist that utilizes problems of various kinds as well as simulated patients."

"There should be more small group meetings requiring pre-class preparation and participation by the student.

. This at least requires students to look up material and is closer to independent learning than memorizing lecture notes."

"Interactive problem-solving small group discussions should be encouraged in which students receive immediate feedback and in which subsequent questions and responses are based upon previous ones."

"Faculty reported that small group teaching with 'built-in' opportunities for problem-solving, literature review, and research would be helpful."

"The role of faculty members as guides to learning (e.g., as tutors in the small group setting) is of greater value than roles as instructors presenting knowledge which is readily available from standard texts."

Impediments to Change

■ Large classes, the explosion of information, and time constraints are impediments to limiting lectures and to increasing opportunities for learning in small groups.

"Our large class size favors extensive use of lectures, which are efficient for faculty, rather than more individualized approaches. Lectures have been extensively supplemented by handouts and syllabi. Unfortunately, a correspondence school atmosphere has developed where students increasingly substitute the notes of others and the use of syllabi for attendance at lectures."

"Because of the time commitment required in conducting small group sessions (vs. a one-hour lecture), there is a pressing need for *adequate incentives* and reinforcement for faculty commitment to teaching, and better utilization of clinical faculty."

"An identified shortcoming is the dominance of teacher centered instruction with limited interactive and independent problem-oriented student learning. The teacher centered trend is reflected in the progressive growth in lecture hours at the expense of small group and independent study; and in the diminution of unscheduled or flexible time for students to use at their own discretion."

"Faculty feel constrained by the format of national licensing examinations which require highly detailed, factual knowledge for successful performance."

"Faculty attempts to stimulate curiosity are often hindered by the sheer bulk of course materials that an individual discipline feels it must impart."

"It is a fear of many medical school faculty that an omission of a particular piece of knowledge may cause irreparable damage to the student's education (or Board scores) that leads to the accretion of an excessive burden of required information."

"We teach to save time, and too often, as there is so much to teach and so little time, few moments are left to contemplate the process."

"We must challenge the most basic assumption in the booklet 'Charges to Working Groups' that there are two years of biomedical science education and two years of clinical science education. If that truly were the case, most of the problems that have been cited would either not exist or would be greatly diminished. The truth is that the biomedical science education, the basic sciences, even those more properly called the preclinical sciences . . . have been reduced in most schools to the first year plus a variable but always minor segment of the second year."

"Faculty feel constrained by the format of national licensing examinations. . . ."

"Pruning course content and shifting emphases in instruction (as from delivering endless details in didactic form to concepts and information gathering skills) will require a courageous effort by faculty to overcome the emotional aspects and territorial demands of curricular planning."

Evaluation Methods

■ Faculties want students to become independent, problem-solving learners and are concerned that the type of examinations they use inhibits students' achievement of this goal.

"If the exam system changed to, say, essays, I wouldn't study to memorize facts as much. For an essay exam I would study concepts and principles like I did in college. The general process of medicine would be important. We're oriented too much to multiple choice and I think that emphasis is to do well on the Boards."

"Assessment of students should emphasize the use of information and skills from basic and clinical sciences including the humanities in evaluating, understanding, and managing patient problems."

"Frequent exams are given which means exams on trivia. The students want tests to improve their grade, and departments use them to compete for students' attention. Short answer questions are used, rather than questions to test concepts or ability to integrate data and formulate a hypothesis."

"Methods of examination during medical education must be reassessed and modified to reduce fact recall and improve teaching of analytical skills and evaluation of problem-solving."

"It is the general view that while some conceptual capability is measured by the NBME examination, it primarily measures retained information."

"The NBME examinations influence the structure and content of educational programs by requiring those programs to include NBME oriented material. If these tests are accurate measures of essential knowledge, some influence is desirable. The NBME examinations influence students' perceptions of the faculties' educational goals by demonstrating that much but not necessarily all of the material stressed on the examination was emphasized by their faculties."

"On the one hand, it is felt that the absence of Part I of the NBME could lead to an erosion of the role of basic sciences in medical education. On the other hand, the current form of examination is felt to have detrimental influences on medical education by putting a premium on the learning of facts and by downgrading conceptual learning and problem-solving."

"The influence of the NBME that is inconsistent with the educational philosophy of most faculties is the requirement for specific answers to general concepts that can/should be considered in several ways."

"Two alternatives to the NBME exam were described: 1) develop an institutional examination in each discipline; and 2) develop year end written and/or oral examinations. If a written examination is administered, it should be problem oriented and permit open-book responses."

"National Boards Part I is intended to test students' knowledge of the preclinical sciences. Given the positioning of National Board exams at the end of the sophomore year of medical school, these act as a deterrent to spreading these courses out beyond this artificially imposed time frame. This is especially true in those schools that require passing National Boards for promotion to the junior year. But even in those schools without this requirement, the practical aspects are that National Boards are required eventually for licensure and the students find it advantageous to take them at the end of the sophomore year. It is suggested that National Boards be redesigned to accomplish other goals besides informational recall (i.e., problem-solving, logical thinking) to enhance changes in instructional methodologies for preclinical teaching."

"The deficiencies of the National Board of Medical Examiners, Part I and Part II are apparent to this faculty. We recognize that the majority of questions seek to identify the store of information with little concern for problem-solving competence. We accept these examinations primarily as one additional measure of curriculum effectiveness."

"Indeed, in our modern classroom there would seem to be little need for anything apart from rote memory skills, an eye for the exceptional (so as to choose C, and not A, B, or D), and a thorough grasp on a 2-dimensional view of knowledge."

"Educational research and development programs should be encouraged toward the design of evaluation techniques that test the process of thinking and not merely the memorization of facts."

"Finally, many faculty urged that there be less use of multiple choice tests of memory and facts in favor of essays, papers, and oral examination strategies."

Computer Technology

■ Computers have the potential to decrease students' need to memorize a large body of facts and to assist them in developing analytic and problem-solving skills. But, the lack of faculty experience with computers and the cost of the technology appear to inhibit their incorporation into medical education.

"Information management technology will not have a significant effect on the quantity of essential knowledge that students must learn, but will permit advanced exercises in problem-solving to the advantage of the medical student."

"Computers were seen as powerful teaching tools which would assist conceptualizing and application of scientific knowledge to problems."

"Traditional methods of teaching, requiring memorization of a vast quantity of detailed information should be deemphasized. Library/information professionals should provide the necessary training for accessing available printed and computerized bibliographic sources and instruction in the use of computers to search available databases as well as create personal information files."

"In less than a decade, the majority of the entering class will have had some computer experience."

"Faculty will need to have confidence in the concept that information gathering skills can, in fact, replace the memorization of specific details before they will implement changes in their courses."

"The reaction was generally negative to the idea that information management technology would have a significant effect on medical education any time soon. Computer based systems which have been available to assist in making medical decisions have not proved popular with students or faculty to date."

"The use of computers in medical education is limited; the potential is unlimited. Computers are available; programs are not. The value of computers in independent learning, computer-based decision making, patient data retrieval and office management is recognized. Financial restraints require that each medical school faculty establish priorities in this area and utilize available resources in a limited number of courses."

"Before faculties can prepare students to use electronic technologies effectively, the faculties must themselves become computer-literate, so that they can serve as role models."

"Debate continues within the faculty concerning the manner in which the curriculum should introduce students to modern computerized information management systems. The library staff have urged formal curricular offerings and/or electives in information access and management. Other faculty have argued that we should assume entering medical students in the future will be computer-literate and should not expect to spend time in a medical school curriculum on that topic."

"For the next five years, emphasis should be placed not on teaching students about the new technologies, but rather on teaching faculty about the field and about applications which will improve their effectiveness in teaching basic science and clinical skills."

"Students are better trained in computer utilization than faculty. Faculty development and education in computer technology will be necessary to accomplish the goal of generalized utilization of computers in medical schools. Computers currently are expensive, and a common language does not exist in computer-assisted instruction."

"In less than a decade, the majority of the entering class will have had some computer experience. We must begin now to identify the information processing skills they will need as physicians, develop the resources that will be required to teach these skills, and plan ways of incorporating them throughout the curriculum. We will also have to initiate programs to educate the faculty since, among other reasons, our ignorance will be highly visible."

"A core of essential knowledge and concepts will continue to be necessary for all physicians. As this core changes, appropriate attention may be given to the use of computer technology. Implementing this technology during the basic science years will cultivate competency in its subsequent application to clinical decision analysis."

"The development of computer technology in teaching and self-education deserves great emphasis because it provides a new dimension in skill maintenance and data acquisition for most physicians."

Summary of Comments

The rapid advance of biomedical knowledge and technology has created a dilemma for both faculties and students. The rate of increase of knowledge and technology is expected to accelerate even more and require physicians to be independent learners with the analytical and problem-solving skills that will enable them to maintain pace with new developments. However, the dominant methods for teaching and examining medical students often do not promote the development of these skills.

There is a call for faculty members to serve as guides, assisting students to learn rather than be conveyors of information available in books, journals, and other media. For faculty members to fulfill this role, there is an acknowledged need for improved communication among disciplines to identify the knowledge and concepts to be learned at each stage of students' general professional education.

Freeing students' time by reducing the number of lectures, particularly in the preclinical phase, is considered important, but most proposals for reductions are only in the range of 10%, a decrease of one to two lectures per week. Small group instruction and increased laboratory experience are extolled, but limitations on faculty time combined with a reluctance to forego lectures appear to inhibit expansion of these modes of education.

The predominance of multiple-choice examinations is viewed as unfortunate and incompatible with evaluating students' abilities to reason analytically and solve problems. The National Board examinations are acknowledged to test principally students' abilities to recall isolated facts. Some faculties express the desire to use alternative evaluation methods, such as papers, essays, and oral examinations, but using these methods will require abandonment of teaching methods based on conveying information. Breaking the cycle of examinations reinforcing teaching methods, and teaching methods reinforcing examination methods, appears to be a major conundrum.

Computers are acknowledged to have increasing potential in medical education. Computer-based medical information systems are expected to relieve students and physicians of the need to remember large amounts of information. Although a few are concerned that computers might displace physicians in clinical decision-making, many believe that computers will assist students in developing problem-solving and analytical skills.

The incongruity between how medical students are taught on the one hand with the almost universal goal to prepare them to be lifelong learners capable of critical analysis and able to apply new scientific principles to medical care on the other is targetted as a problem worthy of major attention. The institutions are cognizant that there is a problem, but effective solutions face formidable obstacles.

PERSPECTIVES ON CLINICAL EDUCATION

Concern about accomplishment of the goals of general professional education is not confined to the preclinical phase. The rigidly organized and often overcrowded preclinical years stand in contrast to a permissive, often poorly-integrated clinical education that is frequently undersupervised by faculties.

Clinical Knowledge and Skills

■ The acquisition by students of the fundamental clinical knowledge and skills that all physicians must have as a basis for their specialized education is considered the primary goal. However, lack of specific delineation of the knowledge and skills that are essential for students' general professional education and the diversity of clinical services that are used for clerkships appear to make uniform accomplishment of this goal dubious.

"Before progressing into a clinical clerkship a student should be able to communicate comfortably with a patient in low stress situations, should be able to ask questions in an intelligible fashion and should know how to build questions based on previous information. The student should be able to perform the tasks necessary to examine a patient, i.e., use simple diagnostic equipment and recognize when a variation from normal or usual is present."

"Clinical clerkships in most settings are apprenticeships rather than designed educational experiences focused on carefully monitored experiences in the case method—although that is what the objectives of most clerkships emphasize. Students are often assigned to a 'team' and learn by doing what house officers do. Their major supervision is by residents who rarely have any training as teachers or time set aside for clinical duties for teaching. Students are infrequently observed and monitored in the basic elements of the case method."

"One concern is that the present clinical experiences have evolved without adequate coordination between phases or a concept of the ultimate outcome desired to serve as a basis for the clinical curriculum. The committee believes that the clinical curriculum should provide a logical well-coordinated sequence of experiences which will best help students to develop attitudes, knowledge and skills appropriate for all physicians."

"Most students clearly understand the objectives for preclinical courses, but find difficulty—especially in the area of skill mastery—in determining the expectations of their clinical professors."

"There is concern that we increase the specificity of the clinical skills to be attained and that we sharpen the documentation of the achievements. The most recent initiative is the identification by observation and examination of the clinical skills of our rising senior students."

"Because teaching fundamental clinical skills is carried out in a decentralized fashion throughout the teaching hospital system, there are constant complaints that one or another clinical skill or experience is being neglected."

"Clinical education is uneven, because it occurs in a widely distributed network of hospitals and other facilities which are heterogeneous in their nature and the teaching abilities of their staffs."

"Faculty recognize that the educational experience during clerkships must be planned with great care because it is threatened by the variability of the clinical services that are not oriented to educational purposes."

Specialized Faculty

■ The delineation of the fundamental clinical knowledge and skills that medical students should be expected to acquire is hindered by the fragmentation that arises from the high degree of specialization among faculties.

"Medical college faculty each have a perspective on their own area of interest but are not as well informed on the curriculum as a whole. Medical students are left to absorb and synthesize a large amount of what appears to them to be disparate information. A tendency toward fragmentation due to specialization can be found in all curricula."

"Presently, faculties do not differentiate very well between the clinical knowledge essential for all physicians and the knowledge graduates need for specialized education. In most areas of medicine, what is required for all is simply conceived of as something less than is required of the graduates of the specific residency programs. However, it is not differentiated on the basis of sound educational concepts, or in regard to the professional development of medical students."

"The orientation of clinical teaching is to specialties, because that is the way most hospitals in academic medical centers are organized, both politically and for the patient care."

"Very often students at the clerkship level are exposed to the most complex problems requiring hospital care, and have relatively little exposure to the diagnosis and treatment of the more common and less complicated clinical problems—that seems paradoxical."

"Faculties do not differentiate between the clinical knowledge that is essential for all physicians to have and the knowledge necessary for specialist education. To achieve consensus on the clinical knowledge that is essential for the general professional education of the physician, faculties should obtain information from a committee of practicing physicians, and basic science and clinical faculty. In addition, this consensus should be examined by intradepartmental discussion."

"In general, core lecture series developed by faculty of clinical departments do not distinguish between the clinical knowledge that is essential for all physicians and the knowledge their graduates should have to be prepared for specialized education. Most lectures in a core series revolve around the interest of the faculty and the strong suits of the department."

"Most of the clinical faculty, with the exception of family medicine, felt that the specialist should determine what a physician in general practice needs to know about clinical medicine. No process for consensus emerged except the current 'core' rotations through the various clinical departments. In order to delimit the knowledge students should acquire, clinicians advocated that they learn through clinical experience with the kind of problems frequently encountered in private practice. However, they found it difficult to describe an undifferentiated clinical year for students at this institution. Clinical chairmen also often spoke of their need to recruit residents when dealing with this question."

"Faculties do not differentiate between the clinical knowledge that is essential for all physicians and [that] necessary for specialist education."

Ambulatory Settings

■ Clerkships on inpatient services do not completely fulfill the needs for medical students' general professional education. Education in ambulatory clinical settings is frequently mentioned as a necessary component of the ideal clinical experience, but faculty priorities, the time involved, and cost appear to be formidable constraints.

"An alternative to the traditional disciplinary clerkship would be an out-patient clerkship which would integrate several disciplines. Multidisciplinary clinics and required out-patient experiences during the third and fourth years would increase students' opportunities to follow patients with chronic problems and minor illnesses not requiring hospitalization. Ambulatory clerkships are uncommon because 1) they are viewed as less exciting and less important, 2) coordination and regulation of these programs is more difficult and more frustrating, 3) they are expensive in terms of faculty time, and slow down patient flow, and 4) faculty often feel less comfortable in precepting out-patient clerkships."

"Although deficits in essential knowledge may result from concentrating the clerkship experience on in-patient services, the most severe deficits are in out-patient care and preventive medicine. Clerkships in ambulatory settings are uncommon for varied reasons. Principal among these are time constraints of the student's schedule, the inability of the student to follow the slow time course of chronic disorder, and the opinion that acute care best demonstrates the important features of medical science."

"We feel that it is more efficient to teach on in-patient services where a patient is identified and available at almost any time. Since a medical student has only a limited number of weeks to spend on any one clerkship service, the in-patient service provides a more predictable, controllable teaching environment. Proper care of many chronic patients may involve only occasional contacts over periods of months and years."

"The ambulatory patient is very often much less likely to be willing to spend time with medical students, and such contact with students often ties up space in a busy ambulatory care setting, which increases the cost of that operation. Comprehensive evaluations of patients in ambulatory care settings, as a result, are very limited. There is also an attitudinal issue, namely, that many faculty feel the ambulatory setting is not a good learning opportunity for medical students (in part because the problems are seen as far less challenging)."

"Very often students' exposure to clinical problems which are concentrated on in-patient services in large university medical centers severely

limits their exposure to common problems of patients."

"A quality experience in ambulatory care should be a mandatory component of the clerkship program. This implies not only a commitment by the faculty, but also a funding priority of the schools which will realistically compensate rural and urban primary care, and part-time clinical faculty for the loss of income incurred as a result of teaching."

Neglected Disciplines and New Emphases

■ A number of areas are considered to receive insufficient attention in the general professional education of the physician.

"Disciplines or special areas considered to receive insufficient emphasis in medical schools are computer applications, economics, ethics, gerontology, interpersonal relationships, law, and sociology."

"Other areas felt to be essential, but not usually taught in medical school are reflected in our inclusion of ethics, medical jurisprudence, medical economics/comparative health care systems, public health, preventive medicine, environmental and occupational medicine, and epidemiology in the curriculum."

"In general the following areas are perceived to receive insufficient emphasis: medical ethics, the role of human behavior in determining values, psychosocial issues, occupational health, behavioral modification and changing lifestyles in the prevention of disease, computer literacy, the methodology of problem-solving, and cost effectiveness."

"Disciplines or special areas that receive insufficient emphasis in our medical school are geriatrics, computer science and nutrition."

"Disciplines that receive insufficient emphasis include clinical nutrition, oncology, gerontology, sociology-psychology (including stress identification and management), health policy and planning, medical economics, practice modalities, ethics, and preventive medicine and epidemiology."

"Initial efforts of our faculty should be directed toward the areas of health team communication, epidemiology, emergency medicine, and computer use."

"The alumni, in particular, felt weak in certain areas. Most of these are interdepartmental in nature, such as nutrition, medical ethics, and critical analysis of the current literature."

"The phenomenal growth of high technology in health care and medicine must be balanced in part by the preventive medicine/community health 'ethic,' which stresses an integrating and broad-based education to serve the complex health needs of people in modern communities."

"Generally among faculty there was a call for role modeling as a means of emphasizing the importance of preventive medicine, but they also saw difficulty with providing significant modeling in a tertiary, episodic care institution where the emphasis is on illness rather than wellness. Many clinicians pointed out, too, that there is little glamour or excitement associated with preventive medicine, and there are financial disincentives to its practice."

"Preventive approaches to the practice of medicine should also receive greater emphasis in medical school training. Since training in the clinical years emphasizes the care of hospitalized patients with acute problems, the student has almost no experience with patients who are well and, in whom the effort is to keep them well. The actual practice of preventive techniques takes place predominantly in pediatrics, but medical students frequently have no exposure to well child care in their training."

"Our faculty is concerned that all physicians should be skilled in identifying and applying measures to prevent disease. This is an area of renewed interest and great flux in medicine. Rather than more time for the subject, our respondents called for both sharper faculty and student awareness of the means of determining risks for patients and for the realization that the best prevention is often a widely shared responsibility rather than physician dominated."

"Students should be exposed to the principles of preventive medicine early in their training. One approach used at this institution is to have students look at their own lives and, in particular, what lifestyle factors and environmental exposures they face that may put them at risk of injury, disease, or death."

"The medical student should be taught the value of patient education. There are many areas where disease prevention by patient education has been shown to have exceptional impact on both health and life."

"The committee feels that there should be some consideration for student education in the fiscal aspects of health care, specifically, an understanding of health care costs and an appreciation for health care cost containment."

"Socio-economic issues that are particularly relevant to the practice of medicine include the legal rights of patients, malpractice features, and efficient utilization of medical resources. All of these should be discussed openly and directly with the medical students throughout their education. Constant emphasis on all the faculty to involve these aspects in all teaching and discussions must be made."

Values and Attitudes

■ Having students develop desirable values and attitudes is viewed as an integral part of medical education, but the degree to which these qualities are cultivated is open to question.

"Subcommittee members conclude, however, that medical education is lacking in its attention to personal qualities, values, and attitudes. With the exception of some clinical services, faculty rarely stimulate curiosity; they rarely promote intellectual drive and imagination. Faculty pay little heed to personal growth and development or the emotional stresses students experience. Faculty do not consider of equivalent importance the responsibility to prevent disease, to relieve suffering, to assist the afflicted in adapting to impairment, and to console patients and their families. In short, faculty fall short as role models for nascent physicians."

"The faculty involved in teaching both fundamental and clinical skills must serve as role models for medical students. This is particularly important in those clinical disciplines where teaching is by example. How the faculty member responds to the medical, social, sexual, and financial problems of the patient can be a very important learning experience for the student."

"Empathy towards the patient is an essential quality of the physician, but in most clinical interactions, the emphasis is on 'the finding' as opposed to 'the patient'."

"The patient and concern for his well-being is the center of *all* medical education. From this principle proceeds

the first major modification necessary to improve medical education: teaching and learning must be oriented to the patient. We must see the patient at the bedside with the student; we must *listen to* and *talk with* the patient; we must examine the patient with our five senses not once but regularly. In summary, teaching must return to the bedside in the clinical training."

"The language students and faculty use in talking about others, including patients, is very important—setting standards of concern for the welfare of others in the community. The size and bureaucratic complexity of many of our organizations make difficult the personal human contact in which this sort of interpersonal support can be achieved. Breaking down medical school communities—in any one of a number of ways—is important to achieving these objectives."

"Many students describe feeling a pressure to relinquish their 'youthful ideals' and to fit into the system around them; they become cynical and mistrustful, and may see few (if any) outlets for the idealism which initially shaped their career choices."

"The close interaction between clinical clerks and residents has many plusses, but a serious minus is that it fosters a detachment from the patients as human beings. The residents are under pressure to 'get the work done' and their level of interest in a patient decreases sharply with clinical improvement and resurgence of the patient's personal problems and resentment at off-hand treatment."

"We think the second year *residents* are the key actors because they have the largest influence and we (the system) have dehumanized them. We are considering four-day workshops along the lines of the Human Dimensions in Medical Education Program to be conducted for second-year residents *and* faculty by skilled external facilitators."

"Students enter medical school with a great deal of idealism. They wish to relieve suffering and, if possible, restore patients to health and to a full, productive life. Some of this idealism is replaced with cynicism as a result of the demeaning, often-times dehumanizing training and the disrespectful and sometimes abrasive manner in which physicians interact with paramedic personnel, students, colleagues, and even patients. Medical education must enhance understanding, kindness, empathy, integrity, intellectual curiosity, and humaneness. The student must possess these qualities before entering medical school. The patient should always be treated with respect, and considered a person and not just a disease."

"A deficiency is that few positive appropriate role models are available. Faculty attend little to personal growth and development of students."

"Concern for the welfare of patients is developed primarily by the attitudes of faculty. It is inhibited by disparaging remarks; by the use of first names and other negative labels; and by placing other work above patient care. This can be reversed only by constant attention to the primary goal of the physician, the patient. Faculty must demonstrate that the treatment of disease should be secondary to the treatment of a patient with disease."

"Students enter medical school with a great deal of idealism. . . . Some of this idealism is replaced with cynicism. . . . "

Supervision and Evaluation

■ Closer supervision and evaluation of medical students by experienced faculty members are considered to be essential. Although the role of residents in the clinical education of students is acknowledged to be both necessary and desirable, their lack of time and experience is considered a hindrance.

"The major teaching format of clinical medicine in medical school has been the clinical clerkship based on the case method of study. This is a very effective method provided that the faculty involved are well-trained clinicians interested in teaching and in students."

"More supervision is required, not only in the second year, but in the third and fourth years. There should be at least a couple of times during the second, third, and fourth years where a student is closely watched by an instructor while the student does a physical, and there should be discussion by instructor and student as to the content of the examination."

"A much closer supervision of junior clerks by clinical faculty is needed. Students should receive feedback on their performances not only at the end of but also during the clerkship period. As soon as problems are identified, attempts should be made to remedy them."

"Students are not reliably evaluated for all categories of facts, concepts *and* behaviors which are expected to be mastered. This includes histories and physicals."

"However, the participants also pointed out that none of the assumptions touched on the means by which clinical and interpersonal skills are evaluated. They perceived that too little time is devoted by faculty to the observation and development of individual students' history gathering and physical examination skills."

"There should be more effective supervision of clerks by preceptors with certification that the student can perform the fundamental skills required. We would suggest a 'log book' kept by the clerks in which the ability of the clerk to perform essential skills is certified by appropriate preceptors."

"A commonly expressed concern by students in some schools is the relative inaccessibility of the full-time faculty, which leaves the teaching to the house staff and attendings. The large role played by the house staff may account for the excellence of the learning process, because of the students' one-on-one interaction with competent, generally admired, near-peers. Nevertheless, we note that (with exceptions) residents are too busy and inexperienced to provide a continuing in-depth evaluation of students in the clinical rotations."

"A thorough examination of all required clinical clerkships is nearing completion. A common theme in these reviews is the critical role played by house staff, not only in teaching clinical medicine *per se*, but also as role models in developing desirable attitudes and behavior toward patients. Expectations of house staff from teachers should be made clearer, and we need to help them to become better teachers by offering training opportunities."

"House staff can contribute enormously to the education of the clerks provided they are informed of their role in the program and have been prepared for it and have the time for it."

Elective Senior Year

■ The predominantly elective nature of the senior year is called into question.

"Like many institutions, however, we are concerned about the quality of fourth year students' experiences. Too often, senior students function in an observer capacity and/or at levels inappropriate to their training and experience, such as on the subspecialty consultation services. We believe that some return to externship/subinternship experiences is important to students' development—both in knowledge and clinical skill and in developing responsibility for patient care."

"... the fourth year 'elective'... can result in a leisurely amble through a cafeteria of academic medicine. ... "

"Another consideration is the question of whether the school should require certain 'selectives' in the senior year which it currently does not do. The lack of such requirements has led to the perception of compression of the curriculum within the first three years. Such compression obviously could be relieved to some extent by requiring that some selective courses be taken in the fourth year."

"Medical school senior electives have not had clear educational objectives and evaluation methods."

"Students often choose electives that are geared to impressing the members of (residency) selection committees rather than serving their personal pedagogical or intellectual goals and interests. Selection committees and the directors of departments throughout the country reinforce this in many ways by urging that students take elective experiences in their hospitals if they are to be seriously considered for a position."

"Certain 'required' clerkships may spill over into the fourth year, but generally the fourth year 'elective' opportunities can result in a leisurely amble through a cafeteria of academic medicine, in curious contrast to the rigidly adhered sequence of prerequisites and the furious pace of the first two years. This is not necessarily bad, but, in oversimplified terms, we have asked ourselves whether one solution to the overfull medical curriculum might be to utilize all four years. Clearly, the elective experiences are important for students to determine or validate their choice of specialty, and electives away from home base are valuable in several ways. Nevertheless, we have considered that a balanced 'tightening-up' of the fourth year could be seen as an approach to 'loosening' the earlier part of the curriculum."

Program Integration

■ Integration of basic and clinical science education is under discussion in some schools. Greater involvement of basic scientists in the clinical phase and clinicians in the preclinical phase is thought to be desirable, but there are significant barriers to modifying the biphasic nature of medical education.

"The traditional 'educational moat' between the basic science and clinical science years must be abolished with a willingness of the basic scientists to 1) allow entry of the clinical scientist into the first two years of medical school, and 2) movement of the basic scientist into the unfamiliar territory of the clinical wards and training sites. The clinical faculty have to abandon the concept that the basic scientist's contribution is terminated at the end of the sophomore year and accept the concept that the basic scientist has much to contribute to the overall prevention, diagnosis, and management of disease in the actual patient-oriented environment."

"There is a need to bridge the gap between the basic sciences and the clinical years. Basic science faculty should have greater involvement in clinical education. This could be accomplished by including regular pertinent input from the basic scientists into the clinical years. It was suggested that some basic science teaching be interspersed throughout medical education rather than simply preceding the clinical years. This would increase the clinical relevancy of basic science information, help students develop a scientific approach to clinical problem-solving, and reinforce the material taught during the first two years of medical school."

"That basic science must precede clinical study is a tradition which must be examined. Many students enter medical school these days better prepared in certain areas than they did several decades ago. The study of basic sciences does create a literacy and a capacity to understand, which is helpful in the clinical arena. However, the problems in clinical medicine may provide a vehicle and confront the students with a 'need to know' which may be an important motivator to the study of basic biomedical sciences."

"The preclinical courses are not well integrated with clinical experience. The preclinical faculty are limited in their awareness of the informational needs of the student in the clinical years. The result is that the students question the relevance of preclinical courses. The perception of lack of relevance interferes with the student's ability to learn under what are generally regarded as less than ideal conditions, i.e., several hours of lecture five days a week for two years. The preclinical information is critical to the student's future success as a clinician who is to operate in a scientifically sophisticated world. Preclinical and clinical faculty must interact more and share goals and objectives."

"A pool of basic science faculty should be identified who can serve as 'attending scientists' much as senior clinicians assume clinical responsibility. These individuals should attend rounds and clinical conferences to provide fundamental topical reinforcement within the clinical setting. This should provide clear advantages to the basic science faculty in teaching orientation for subsequent classes."

"Study of basic science need not precede clinical study. The two might be taught simultaneously. Such an approach might be better than the present curriculum of basic science followed by clinical study because students would appreciate the importance of basic science information to clinical practice. ... Integration of the study of basic science and clinical study would reinforce the former. Conferences in small groups of stu-

dents would be an effective means of reinforcement. The groups should be led by basic scientists with an appreciation of clinical medicine and by clinicians with an appreciation of basic science."

"Effective conferences will require dedicated faculty who are knowledgeable about their subjects. Acquisition of such faculty could be a problem. Many basic scientists wish to be free of heavy commitments to teaching. Coordinated conferences involving both basic science and clinical faculty would require considerable effort if the conferences were to be effective."

"... learning in basic and clinical sciences should be carried out throughout the undergraduate curriculum under teachers of both categories working in collaboration."

"A month-long postclerkship educational program has been designed by the curriculum committee planning group to consolidate core medical education. The foundation and model for this postclerkship conference design has been a series of sessions called 'the scientific basis of medicine'."

"'Return to Basics' courses planned should enhance student synthesis of information, improve appreciation for the basic sciences as a foundation for clinical sciences, and bring basic and clinical faculty together to discuss applications of basic sciences to the practice of medicine."

"The strongest position identified in the structured questionnaire and in the open-ended comments by faculty suggests that learning in basic and clinical sciences should be carried out throughout the undergraduate curriculum under teachers of both categories working in collaboration. This is a new trend of opinion that departs strikingly from the previously held view, reflected in the present curriculum, that students should complete their basic science education before they are inducted into a clinical clerkship which provides no contact with teachers in the biomedical sciences."

Summary of Comments

The clinical clerkship, the traditional foundation of clinical education, too often appears to fall short as a setting for the accomplishment of the goals of general professional education for medical students. In many cases, the delineation of the knowledge and skills that students should acquire is poor. The diversity of clinical services and the highly specialized faculties that staff them make students' educational experiences quite variable. The insufficient involvement of senior clinicians in direct supervision and evaluation of medical students provides few guarantees that all students acquire the fundamental clinical skills. Few question the major role that residents play in medical student education, but many consider the burden of their workload and their lack of teaching experience to be hindrances to their effectiveness in that role.

Concern is expressed over the amount of attention that faculty pay to the shaping of students' personal qualities, values, and attitudes. The need for increased involvement of experienced clinical faculty in the education, supervision, and evaluation of students is cited repeatedly as the most important measure to counter these deficiencies.

The predominant setting for most clerkships, inpatient services with patients who have complex health problems, is viewed with ambivalence: although it exposes students to the more challenging problems of medicine, it does not provide them with experience in the treatment of chronic illnesses and common diseases. Thus, many stress the need for clerkships in ambulatory clinics where students can acquire this experience.

The areas most frequently mentioned for greater emphasis in the general professional education of the physician are ethics, legal issues in medicine, the economics of medical care, nutrition, and prevention. Comments on prevention tend to focus on the role of physicians in assisting patients to adopt personal measures to prevent disease.

The elective senior year is seen as an opportunity for students to have experiences in several specialties, but its value for their general professional education is questioned. Some faculties believe that more structured experiences are needed.

Greater integration of the basic and clinical sciences is frequently mentioned as a way to improve medical education. However, effective involvement of basic science faculty in clinical settings appears to be difficult. Some schools are instituting a "return to basics" course in the senior year.

PERSPECTIVES ON COLLEGE PREPARATION AND ADMISSION TO MEDICAL SCHOOL

Both college and medical school faculties are concerned about how students who aspire to be admitted to medical school are educated in college. A continuum of education between college and medical school is difficult to realize because there are so many colleges and communication between them and the medical schools is variable and too often deficient.

Balanced College Education

■ A balanced liberal arts education consisting of rigorous learning in the natural and social sciences and humanities is widely considered the optimal college preparation for medicine. However, the concern that too few students achieve this balance is widespread.

"The important thing premeds should be told is not to race through the undergraduate years, taking as many science courses as possible; but rather to compile a balanced record of achievement with a coherent program

of study outside the sciences as well as within them."

"Far too many young men and women devote their college years to squandering their talents in acquiring a veneer of the type of education they believe will please an admissions committee. For them, college is not a place to sharpen critical skills, investigate options, and experience intellectual stimulation and growth. It is a mine field to keep them from achieving their goal of entering a profession which they have idealized, but about which many of them are profoundly ignorant."

"The breadth of undergraduate preparation is essential. The concept of specific criteria for achieving a broad education, and of breadth of preparation, are almost mutually exclusive. We would not wish to prescribe or to proscribe in relationship to undergraduate education. Explicit statements in admissions criteria and clear action by admissions committees can encourage students to acquire a broad baccalaureate education and not be penalized by doing so."

"Medical students (and therefore, doctors) are usually not well educated persons in the broadest sense. The competition for acceptance to medical school frequently causes premedical students merely to 'get their tickets punched' in the humanities, without the reflection and insights into the human condition which are expected outcomes of such exposure."

"A restricted curriculum is the result of what may be a mistaken notion on the part of the premedical student that medical school admissions committees desire to see a preponderance of science courses on an applicant's transcript. Medical schools need to change this message they are giving to premedical students."

"The lack of independent intellectual drive on the part of premedical students is apparent since many feel that their sole purpose at the university is to get into medical school. Therefore, they base their entire college curricula on that goal. This is distressing, not only from an educational point of view, but also because such an attitude on the part of the students is counterproductive to their eventual role as physicians. Specifically, we see two major problems: 1) students restrict their choice of classes to a very narrow curriculum; and 2) students place more emphasis on grades than they do on learning."

"Premedical students as a group tend to avoid rigorous nonscience courses. This is deleterious to their liberal education. Premedical education does not necessarily encourage independent learning, but rather may be described as a series of technique courses seen, more often than not, as necessary evils. It borders on the trade school approach to education. Future clinical physicians should be broadly educated, not narrowly trained."

"Students shy away from courses and teachers known to be difficult, regardless of their potential intellectual value. They are reluctant to explore new areas. In short, they are afraid to do anything that might jeopardize their grade point averages (GPAs). They want to take courses they think will be the easiest for them or because they have been told by medical students and physicians that they will 'make medical school a lot easier'."

"Medical students (and, therefore, doctors) are usually not well educated persons in the broadest sense."

"There was unanimous agreement that premedical education does not provide sufficient exposure to social, economic, and political issues that would be helpful to later understanding of the ways in which these issues affect the overall role of health professions in our society."

"Once medical schools choose to revise aspects of their admissions policies, their expectations of students, and their own modes of teaching, undergraduate colleges and universities will gladly make responsive changes."

Sciences Versus Humanities

■ Debates surrounding the issue of a "balanced" preparation for medical school often entail a conflict between those who argue that the continuously expanding scientific base of medicine necessitates a greater concentration in the sciences during college, and those who think that a broad liberal arts education constitutes the best preparation for medical school.

"In recent years a considerable amount of attention has been given to the value of the liberal arts education and education in the humanities. Yet, many advocates of liberal arts education argue that our system of preprofessional education has a difficult time nurturing the development of such an individual because of the emphasis medical schools place on scientific information. There are many among medical school faculties who argue that a strong undergraduate science background is essential because of the knowledge explosion in the medical sciences. Many basic scientists feel we no longer have the luxury of starting at the elementary or basic level in biochemistry, histology, physiology, or pharmacology. Perhaps our scientists are simply overzealous about their subject area and lack the inclination and perhaps the ability to identify and teach only the essentials."

"Premedical education today places a great emphasis on scientific training; inadequate time is allotted to helping the student develop a broad educational background and experience that includes literature, the arts and humanities, foreign language, and computer technology. There is also seriously inadequate training in verbal and writing skills."

"A recommendation to minimize science education in order to broaden other areas of their education is in conflict with two forces: 1) the increasing scientific sophistication required of future physicians; and 2) the heavy emphasis of admissions committees on the MCAT science scores. A minimal amount of science necessary for a student to be successful in medical school should be identified. Medical schools should communicate to premed advisers the desirability of a student with broader interests and educational experience."

"The present pattern of college programs would be less disturbing if premeds were truly learning science. What they are acquiring is much less than that and in the long-run it will serve neither medicine nor humankind well. By conceiving of science as a means to a professional end—and as the only means—premeds are becom-

ing technicians, reasonably adept at the mechanics of mathematics and the sciences, but without any deep understanding of them or of their place in the realm of human knowledge."

"Faculty warned that there is no substitute for insisting on substantial literacy in the sciences. The level may be difficult to deduce precisely, but the willingness to study deeply in the sciences should be mandatory for each medical student. We should recognize that the principal purpose of the college education is not to 'prepare students for medical school.' There is no compelling reason for more nonscience majors in medical school. Rather, we should attract students able and willing to study man and the environment throughout the sciences and humanities."

"... Medical schools should communicate to premed advisers the desirability of a student with broader interests and educational experience."

"The students feel the premedical curriculum should be broadened more than it is and medical schools should encourage this. Many students now regret having concentrated too much on science and missed the opportunity to study other subjects."

"An emphasis on science does not preclude a recognition of a humanistic education. Sensitivity toward the human condition and an appreciation of the highs and lows of human experience is probably best gained through literature. In addition to the English requirements generated by a reawakened interest in writing skills, those preparing for medicine should be urged to take literature courses."

"Admission of the liberally educated student, with breadth of experience in social and natural sciences, is considered to be essential. The ability to analyze the world in which we live, and to express that analysis in writing, would be helpful for matriculating students and faculty alike."

"The great majority of premedical students concentrate in one of the sciences. While we don't consider this a problem, we plan to make available the information about medical school acceptance rates for applicants with various majors so that students who wish to major in a nonscience will know for a fact that in doing so they are not harming their chances for medical school admission."

"The chairman of this committee feels strongly that on the day a committee on admissions tells a candidate well qualified in science that his acceptance is delayed until he has qualified himself in the humanities and social sciences, the often proclaimed need for a broad background for those studying medicine will become a reality."

Reading and Writing

■ The reading and writing skills of many medical students are considered to be insufficient. Colleges are also concerned about the level of reading and writing ability of their entering students and about the degree to which a college education improves these skills.

"Reading, writing, and communication skills are essential for a physician and are not sufficiently stressed in the premedical curriculum. These are, perhaps, the most fundamental skills a physician must have."

"During college preparation, skills in reading, quantitative analytic reasoning, and problem-solving can be developed by a variety of courses, e.g., logic, physics, creative writing."

"The ability to express thoughts in writing is central to the whole concept of a liberal arts education. Criteria for acceptable writing for medical school applicants should be developed."

"We have a perennial concern with students' writing skills. Students come to us with poorer skills than they did in the past. Various courses require them to write short papers, term papers, and essay examinations throughout their stay, but the improvements have not been impressive."

"It is clear that physicians and those preparing to become physicians should be skilled in assessing medical and technical literature. It is also clear that this skill is not well taught at present. Perhaps the most promising approach to teaching such skills lies in applying the concepts of technical writing to technical reading."

"The writing and general communication skills of many students are not developed during undergraduate education and in medical school. In fact, written communication skills may deteriorate in medical school."

"It should be made clear to premeds at this university that oral and written communication skills are vital and that one excellent way to develop them is to take course work in the honors program."

Required Courses

The traditional medical school requirements for courses in biology, chemistry, and physics are generally viewed as reasonable. Additional required courses in the humanities and social sciences are considered desirable by some, but others believe that such requirements would be detrimental.

"Criteria for prerequisite courses must be judged on the basis of their relevance to medical education. The difficulty is that the content of premedical courses is often unknown and variations exist between courses offered by different institutions. However, we believe that a rigid premedical course of studies is not essential; what is of more importance is that the student should have demonstrated intellectual competency or excellence in whatever field he brings to medicine."

"We are concerned that our admission prerequisites are stated rigidly in terms of specific, historically accepted science courses which may or may not provide the student with the knowledge, skills, and attitudes desired in preparation for the medical school curriculum. Furthermore, this emphasis on particular courses and performance in them may result in a group of applicants who are not as broadly educated as deemed necessary for the practice of medicine. In general, the faculty were attracted to the notion that it might be possible to define more specifically the knowledge, skills, and attitudes desired in entering medical students. If this could be assessed, admission requirements could be stated in terms of such items rather than by stating specific course

credits required in individual subjects."

"The premedical students thought that the basic minimum requirements for entrance into medical school were adequate. A majority indicated, however, that there should probably be a specific requirement for humanities and social sciences."

"It is our belief that very little will be accomplished by simply tacking a few more course requirements on to the existing premed program. In fact, some forms of this strategy, such as special courses in the humanities and social sciences for premed students, would actually be detrimental."

"The faculty members, premed students, and former premeds were in remarkable agreement in recommending that a minimum of three courses in the social sciences or humanities, with at least two of them past the introductory level, be required."

"Few contributors were prepared to recommend abandonment of present biology, chemistry, and physics course requirements for admission to virtually all medical schools, but there was a widespread feeling that no additional science requirements or recommendations should be communicated either directly through documents or indirectly through admission practices."

"It would be better to restructure 'biology' as the major undergraduate science prerequisite, and to accelerate its reformation as an analytic science."

"Specific undergraduate course requirements should be determined by faculties of each medical school, with some guidance from their graduates. Required courses in nonscience areas would encourage students to acquire a broader baccalaureate education."

"Medical school admissions policies could include specific requirements for liberal arts courses."

"To encourage broad baccalaureate education, medical schools need only specify courses required for admission. They can also provide evidence that acceptance is enhanced by breadth."

"Assurance of a broad baccalaureate education should be the responsibility of a liberal arts college, but explicit and implicit requirements for admission to medical school often compromise the achievement of that goal. Some have suggested institution of course requirements in social science and humanities to match those now present for the natural sciences, but this is not the path this college faculty, students, graduates, or conference participants would recommend."

The MCAT

■ The MCAT is generally viewed as necessary and useful, but there is concern about overemphasizing its importance.

"Both faculty and students felt that the MCAT scores should be a factor in selecting students for admission to medical school, but not as important as many medical schools consider it."

"Comprehensive tests, such as the MCAT . . . are inherently flawed in that they tend to evaluate test taking abilities . . ."

"Admission of an applicant to medical school should depend principally on the student's college performance. MCAT scores should be used largely to confirm the decision."

"MCAT scores are to be regarded as indicators of aptitude while grade point averages are viewed as indicators of performance."

"Certainly, there is ample evidence that the MCAT is a reliable and reproducible test in terms of a representative sampling of selected undergraduate subject material (mainly science). Its validity for selecting medical students, however, must still be questioned. There are no data demonstrating that MCAT scores correlate with performance in the clinical sciences or with future success in medical careers."

"The MCAT is helpful to admissions committees; however, achievement and knowledge base are measured rather than problem-solving skills. It is suggested that the Reading Skills section evaluate *scientific* reading and comprehension."

"To further encourage students to achieve breadth in their course work, we suggest that the MCAT be modified to include a section or sections on general knowledge."

"If medical colleges are serious in emphasizing the broad background needed for successful completion of the clinical years, then sections of the MCAT should reflect interest in the liberal arts and humanities as a clear signal to students, advisers, and administrators of a shift in emphasis in preparation for the study of medicine."

"Comprehensive tests, such as the MCAT, have their place and do provide some measure of a student's capabilities; however, they are inherently flawed in that they tend to evaluate test taking abilities rather than the skills themselves."

Selection Criteria

■ Colleges criticize medical school admissions committees for using selection criteria dominated by grade point averages and test scores. Colleges are also frustrated by the incongruity between what medical schools state as their selection criteria and those actually used in practice.

"Too many premeds whom I have met are the shell of what they should be. They harbor the mythical belief that the road to medical school consists of earning a high GPA by selecting easy courses taught by instructors who grade liberally, majoring in biology or science at least, volunteering for summer work at a local hospital, and chanting the slogan 'I want to help people'."

"Premeds often have a very narrow perception of what to 'help people' means. In their eyes it must be in a physician-like role with people who are strangers and involve trauma, or at least people who are ill. They don't see their peers as people who might be helped."

"Almost total reliance on GPA and MCAT scores in the early stages of consideration of applicants often causes medical colleges to pass over well-qualified and highly motivated persons."

"The seeming preoccupation of admissions committees with numerical distinctions that represent question-

able differences, and the apparent neglect of other qualities in the assessment of candidates, not only distorts the preprofessional educational process, but also may distort the character of the resulting medical profession as well."

"In an effort to assist the admissions committee interviewer, an instrument has been under development at this medical school by the admissions policy committee in consultation with the psychology department of the university to identify desirable traits. We believe that character and personality traits are of major importance in the performance of physicians, possibly more important than truly exceptional academic ability."

"The message should be clear not only is it possible to be accepted at medical school with an experience that includes a wide spectrum of courses in the arts, social and behavioral sciences, and languages, but also that such breadth is the essence of a most attractive candidate."

"Once the expectations of admissions committees are known, students can be sensible in their choice of courses and extracurricular activities. Once free of the preoccupation with strategies for gaining admission, students may choose more courses in the humanities and the social sciences out of genuine interest. They will be broadly educated."

"The major issues in the preprofessional education of physicians seem more directly related to mixed messages that come to liberal arts college faculties and students from medical school catalogues and admissions committee practices. The resulting insecurity, or lack of trust, has a profound and disquieting effect upon the nature of undergraduate programs, and the atmosphere in which that undergraduate experience occurs."

"We are aware that medical schools value, even to the point of indicating that nonscience majors are viable candidates for admission, breadth in academic training. It is our perception, however, that in the final analysis the admission review process lacks a consistent and firm adherence to this aspect for the selection of candidates."

"There needs to be clear communication between medical schools and undergraduate institutions. Many students express an uncertainty as to what is expected of them and therefore simply copy what other accepted applicants have done."

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"The creation of an atmosphere of mutual trust and understanding among a group of colleges and medical schools may make the options more widely believed and more generally accepted."

"Much of this depends on mutual understanding and trust between the adviser and the admissions office, and a minimum of mixed messages passed on to students."

"Faculty and students expressed some frustration over the ambiguity of signals from medical schools about the qualities that are valued for admission, and this, in turn, leads to confusion on the part of our students about the expectations that we have of them and the qualities or achievements which will lead to strong letters of recommendation."

Summary of Comments

College and medical school faculties alike desire to improve the college education of students who aspire to enter medical school. A balanced liberal education with greater emphasis on the social sciences and humanities is mentioned frequently, but the growing science-base of medicine is invoked as a reason for greater emphasis on scientific preparation in college.

Major changes in course requirements in the sciences are not suggested, but some medical schools are concerned about the variability in course content among the many colleges and recommend more explicit delineation of what students should learn in their science courses.

Reading and writing skills are considered very important and frequently deficient by both medical schools and colleges. Literature courses and drills in technical writing and reading are mentioned as remedial approaches.

The MCAT is useful and necessary, but overemphasized as a selection criterion. Many in the colleges charge medical school admissions committees with an overdependence on "the numbers" (GPAs and MCATs). Selection criteria are often unclear to colleges. They find it difficult to reconcile medical schools' published criteria with those implied by their actual admissions decisions. Closer communication between college and medical school faculties at all levels is recommended repeatedly.

PERSPECTIVES ON FACULTY

Many cite the need to improve medical student education by enhancing faculty members' willingness to devote more time to this central mission.

"Many of the proposals for educational reform coming from this and other institutions and from the several working groups will require investment of major resources. Rebuilding of programs to correct some of the deficiencies will take great energy and faculty involvement. The development of new instructional approaches, the creation of problem oriented models, the supervision of independent study, and the close monitoring of clinical performance, all require considerable effort."

"Yet, medical education is not a major determinant of economic survival of the modern academic medical centers. Grant supported research and patient care provide the dollars and are also the chief determinants in survival and advancement of the faculty. That

is a reality today and will continue to be for the foreseeable future. If anything, the resources specifically dedicated to medical education will diminish."

"At the same time, faculty are in the position of being increasingly more responsible for deriving their own support in a very restricted financial climate. It should be an important consideration of medical schools to give increased weight to teaching efforts of faculty."

"The chairmen and faculty are reluctant, however, to make this commitment to teaching because it necessarily is at the expense of our research programs. Given the realities of research funding and of promotion and tenure, the research commitment is maximized and the teaching commitment is minimized."

"Impediments to the improvement of medical education are: 1) concern of administration regarding involvement in faculty-oriented curricular issues; 2) territorial prerogatives of departments relative to curricular structure and institutional goals; 3) lack of generalized institutional faculty development to reinforce specific positive teaching qualities; and 4) precedence of research and publications over teaching, curriculum development, and evaluation as criteria for advancement and promotion. Better ways are necessary of documenting a faculty member's commitment to and success as a teacher and to reward these abilities in a substantive fashion. Internal peer evaluation permits the development of collegiality, a sense of trust and confidentiality, and the ability to familiarize faculty with other course work within the medical school while, at the same time, preparing an evaluation of course process and impact."

"While there is a general acceptance of the worthiness of these educational goals, it is also recognized by the faculty that an increased emphasis on small group interaction and decreased emphasis on the use of lectures would require an increased time commitment for teaching *per se*, as well as for the development of materials for teaching and student self-study. These increased educational 'demands' are thus coming at a time when institutional and federal funds for support of innovative educational programs are becoming more and more limited, and the demands on faculty to spend more time on research and/or clinical services, as opposed to teaching (preclinical as well as clinical), are increasing. While the institution continues to value teaching as one criterion for the selection and promotion of faculty, it is clear that a better incentive/reward system needs to be defined to produce a redistribution of faculty effort in support of teaching activities."

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"The greatest impediment to improvement in teaching appears to be a lack of recognition and reward. Promotions and tenure depend almost exclusively on research, and the basic science faculty in particular feel they cannot afford the time to expand their knowledge, perfect their skills, and develop new materials in the areas which they teach. Only 17% of our respondents feel that teaching contributes significantly to the current system of rewards at our school; 70% feel that teaching should be given considerable weight."

"The realities of academic achievement standards for faculty deemphasize contributions to undergraduate medical student education. Unless faculty time devoted to developing newer educational strategies is appropriately rewarded and supported, including adequate resources (equipment and money), major changes will not occur. The influence of department chairmen in defining curriculum may preclude major changes in overall educational programs and can be viewed as a lack of reward and reinforcement for junior faculty's participation in educational decision-making."

"The major point made was that faculty motivations and behaviors are dependent upon a number of career-related issues, only one of which is the teaching of medical students."

"A better faculty reward system for skilled teachers is in need of modification. In order for this to occur, a more objective evaluation system of effective teaching will need to be developed and used as a significant factor in tenure decisions made by the faculty promotions committee and the dean."

"The reward system for faculty teaching is being explored by a dean's committee. The ultimate outcome expected is that effective teaching will be clearly identifiable and will be rewarded in a more balanced manner in comparison to clinical service and research. Feasibility and impediments to implementation will depend on the nature of the committee's recommendations."

Summary of Comments

It is recognized that significant improvement in the general professional education of medical students will depend upon the ingenuity of faculties in developing new approaches and their greater personal involvement in guiding students' learning. The time and intellectual effort necessary to accomplish needed changes are considered to be severely constrained by competitive demands for research and clinical service productivity. The lack of documentable evidence for effective educational contributions as a criterion for advancement inhibits faculty members from committing themselves to medical student education. Greater recognition for faculties who become involved in medical student education is deemed essential if institutions are to accomplish the changes needed in the general professional education of the physician.